(5) **TRANSPORTATION**...options for the future

WRITINGS IN GERONTOLOGY

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LE CONSEIL CONSULTATIF NATIONAL SUR LE TROISIÈME ÂGE

Canada

Transportation: Options for the Future

Issues related to Older Driver and Pedestrian Safety

by

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FOREWORD

The Writings in Gerontology Series is intended as a vehicle for sharing ideas on topical issues related to the quality of life of seniors and the implications of an aging population. It is produced as part of the National Advisory Council on Aging's mandate to publish and disseminate information and to stimulate public discussion about aging.

The Council endeavours to ensure that the articles in the series provide useful and reliable information. Most of the texts will be original manuscripts. Some may be written by Council staff while others will be authored by experts in their fields.

This series is addressed to seniors and the people who care about their well-being. It is hoped that readers will find the Writings useful.

The Council welcomes comments on the topics selected as well as on the content of the articles.

Susan Fletcher
Director
National Advisory Council on Aging

PREFACE

For many older Canadians, transportation and mobility are keys to community living.

In the past, the National Advisory Council on Aging has addressed questions concerning transportation for seniors that focused on accessible and affordable public transportation. The Council is pleased to publish this report on a related issue, older driver and pedestrian safety.

The report, entitled Transportation: Options for the Future, was written by Alison MacDonald, Consultant for the Traffic Safety Section of the Canada Safety Council. Ms. MacDonald holds a Master of Social Work degree from Carleton University and is a member and registered social worker with the Alberta Association of Social Workers. The Council extends special thanks to Ms. MacDonald for preparing this timely and thought-provoking document.

Charlotte Matthews, Ph.D.
President
National Advisory Council on Aging

INTRODUCTION

"The transportation problems of older . . . persons have been extensively documented over the last 10 years but it was not long ago that their mobility needs were imperfectly understood or even recognized. "Old Age" was, in essence, frequently perceived by the public and human services professionals alike to be synonymous with age 65 or older, and that meant isolation from daily social and economic activities."

(Lennie-Marie P. Tolliver
U.S. Commissioner on Aging
Keynote Address to the
Third International Conference
on Mobility and Transport)

People in Canada are fortunate. We have plenty of space, a choice of activities, a good standard of living and services to meet most needs. However, many people in our society are unable to fully use these benefits. An example is people who are mobility handicapped due to physical or mental changes associated with the normal aging process.

While the majority of Canadian senior citizens may not be considered mobility handicapped in the usual sense of the term, many find that the effects of the aging process limit their ability to get around as they used to. Reduced vision or problems with arthritis can make walking difficult and can force a person to give up driving. People who continue to drive although their abilities are limited have an increased likelihood of becoming involved in a car accident.

Much work is being done in the fields of traffic safety and transportation in general to encourage mobility and independence for senior Canadians. This article is intended to review the issues and outline the strategies that are being developed to deal with them. It is hoped this article will help people to recognize the signs that indicate a possible limitation to mobility and some countermeasures that can be taken to avoid being involved in an accident. It is directed to anyone interested in the changes we go through as we age, but specifically seniors, people working with seniors and people in a position to influence change.

This article is divided into four sections: the first explains why safety for elderly drivers and pedestrians is an issue. Information is provided on the changing age structure in Canada and the importance of mobility, followed by a discussion of older people and the problems they face on the road. The second addresses the age-related changes individuals often experience that can affect mobility. Third is a discussion of environmental factors that may have an impact on older drivers and pedestrians. The concluding section provides an overview of some possible countermeasures that could be taken by the elderly individual, urban developers, highway planning departments and others who are concerned about these issues.

I. THE ISSUES

"It is no exaggeration to say that losing his driving privileges, voluntarily or otherwise, is probably second only to total confinement in its effect on the driver's lifestyle, his access to the benefits of our society, and his general well-being." (Wiener, 1973)

Canadian society is aging. Whereas people 65 and older made up about 5% of the population in 1900, this figure grew to 10% by 1985 and is expected to reach 18% early in the 21st century. In real numbers, we have seen an increase from 1.05 million in 1950 to 2.70 million in 1986.

TABLE 1

CANADIAN POPULATION 1950 - 2025 (000s)

Age Group	1950	%	1970	%	1986	%	2000	%	2025	%
0 - 14	4077	29.7	6464	30.2	5392	21.3	5796	20.0	6373	19.2
15 - 24	2188	15.9	3929	18.4	4178	16.5	3873	13.4	4003	12.1
25 - 34	2148	15.6	2807	13.1	4527	17.9	3972	13.7	4166	12.5
35 - 44	1809	13.2	2570	12.0	3641	14.4	4834	16.7	4313	13.0
45 - 54	1387	10.1	2272	10.6	2545	10.1	4163	14.4	3931	11.8
55 - 64	1074	7.8	1682	7.9	2328	9.2	2754	9.5	4235	12.7
65+	1054	7.7	1683	7.9	2698	10.7	3534	12.2	6240	18.8
Total	13737	100	21407	100	25309	100	28926	100	33261	100

Source: International Labour Organization
Statistics Canada Census data (1986 figures)

Our society has become dependent on the automobile. Possession of a car and a valid driver's licence allow people to have some control over whether, when and where they

travel. Studies on mobility have found the sense of freedom and control that comes with a driver's licence contribute positively to both perceived and actual well-being, as measured in terms of one's ability to meet their needs for sociability, recreation, community service and self-actualization. (See, for example, Carp, 1987; OECD, 1985; Wachs, 1979.) The loss of a driver's licence, on the other hand, has been found to correlate with lower activity levels, increased dependence on others and lower levels of general well-being. "Its symbolic value is probably at least as great as its actual value. Just as the young person views the licence as a rite of passage into the adult world of independence, so the elderly driver views its loss as a loss of independence and even identity. And indeed this view is based in large part on reality." (Waller, 1987)

Our aging society and the fact that more of today's elderly are car drivers than ever before have brought these issues to the forefront. People who have made major life decisions on where and how to live based on their lifelong access to a car will feel a much stronger impact from the loss of their licence than earlier generations did.

An examination of driving patterns among various age groups indicates that older people, on average, drive fewer kilometers annually than younger people. However, some

researchers question whether part of the reason for this is the fact that older drivers now are part of a generation that never did depend as much on the automobile for transportation. In forty years we may see a group of senior drivers with much higher annual mileage. In fact, a trend among all age groups shows an increase in both the amount of kilometers driven and the percentage of people who are licenced to drive over the past thirty years. (OECD, 1985)

Accident statistics, when based on annual mileage, indicate that as people reach their sixties and beyond they are more likely to be involved in a collision and to suffer serious or fatal injuries as a result. Experts have also found that the types of accidents involving older drivers are somewhat different from those involving younger drivers: they are more likely to be in multi-vehicle collisions and to be found guilty of failure to yield the right of way, making an error when changing lanes or directions or backing up unsafely.

Many people who learned to drive prior to 1950 had no formal driver education and this was felt to be responsible for some of the difficulties they faced. As early as 1962, refresher courses for older drivers began to emerge. Similar programs have developed across North America since that time. Another solution to the problems of older drivers was to

require people over a certain age to undergo knowledge, skill and/or medical testing prior to receiving their licence renewal. More recently, people have begun to ask what can be done to change the circumstances which lead to the increased accident rate without reducing the mobility of the people involved.

Approximately 70% of Canadians presently over age 55 are licenced to drive. In one year, three to five percent of these people will be involved in a motor vehicle collision. Thousands of drivers will be injured in the collisions, many fatally. By working now to reduce the accident rates, many lives may be saved in the future.

II. AGE-RELATED CHANGES THAT MAY AFFECT DRIVERS

"While chronological age per se is usually not a criterion for referral for medical evaluation, with increasing age the probability of developing medical problems increases. It should be noted, however, that in the absence of specific medical problems, age alone has not been shown to be associated with worse driving performance." (Waller, 1987)

As people age, their bodies go through many complex changes. These changes do not all occur at the same time or at the same rate and impact on different people in different ways. Some people may never feel an impact. However, being aware of the possibilities can help people to recognize the

signs which indicate that, as drivers or pedestrians, they may need to adapt their behaviour. As a general rule, these changes begin to accelerate after age 55 and have a noticeable impact around age 60.

o VISION AND PERCEPTION

Visual performance is the most critical medical concern for both drivers and pedestrians. Virtually all information used for driving is collected through the eyes.

The eye's ability to focus peaks at about age 10. Visual acuity begins to decline in the mid to late 20s and the eye's field of vision begins to narrow in the late 30s. At around age 45 the onset of far-sightedness occurs and people begin having more difficulty detecting movement or judging distances. Other problems that may arise include astigmatism, a deterioration in the ability to sense contrasts and increased sensitivity to glare. For those individuals with cataracts or glaucoma the situation is further exacerbated.

Studies have shown that there is a correlation between poor vision and poor driving performance -- as calculated on an accident per kilometers driven basis. This correlation is stronger among drivers aged 50 and over than in the younger

age groups. The same conditions can lead to a higher rate of pedestrian accidents as judgement becomes clouded.

o **HEARING**

Hearing ability also peaks at a young age. Loss of hearing, especially at the higher frequencies, is common with increasing age. There is no conclusive evidence that hearing limitations in and of themselves impede safe driving performance. However, sound is an important alarm system and reduced hearing can result in slower reaction times. Hearing also plays a role in maintaining balance which can be an important factor for pedestrian safety.

o **MOTOR AND PSYCHOMOTOR CAPACITY**

An unavoidable aspect of aging is the loss of muscular force and muscle tone. Atrophy is also a possibility in many cases. These can lead to problems of balance as well as slower reaction times. Drivers with arthritis or back problems may find it difficult to check over their shoulder, thus increasing their chance of changing lanes when it is not safe to do so. Limitations of movement are more of a problem for pedestrians than for drivers but can impede both.

o PATHOLOGICAL CHANGES

Illness is not "normal" at any age but there are many conditions found more commonly among the elderly population that can affect a person's ability to drive or walk safely. Of particular concern are mental disorders, cardio-vascular diseases and osteo-articulatory disorders.

Another related issue arises due to the medications prescribed to deal with these disorders. Over-prescribing and over-consumption of drugs as well as the mixing of drugs and alcohol is a common phenomenon and constitutes a real risk for elderly drivers and pedestrians. Medications have a variety of effects on the body and a person's ability to function normally. Drowsiness, over-stimulation or dulled reactions as a result of medications will have an impact on driving ability.

o COGNITIVE CHANGES

The brain's capacity to filter out background "noise" declines with advanced age. The ability to process information received by the senses can be impaired; this often results in a slower reaction time. This includes both auditory noise, such as a radio playing in the car or traffic noises on the street, and visual "noise", such as high

concentration of signs and activities taking place in the surrounding environment. Elderly people usually compensate for these difficulties by hesitating until they are sure a situation is clear. However, in heavy traffic conditions, there may be too much information entering the brain to allow a person to make a judgement.

Aging may also affect short-term memory. This can create problems when new traffic signs are introduced or if traffic patterns on familiar roads change. As a result, many older drivers may have difficulty processing and retrieving cues to hazardous situations quickly enough to have time to react safely.

As the introduction to this section stated, age alone does not increase the rate of accidents. However, it is important for people to be aware of the changes their bodies are going through and to be prepared to compensate for them. The Canadian Medical Association has developed a booklet, entitled "To Drive? Or not to Drive? The Medical Answer" to help doctors identify conditions that may have an impact on driving ability. Regular check-ups and discussions with the doctor can help to keep people driving safely into the later years.

III. ENVIRONMENTAL ISSUES

"Today's road traffic systems are abundant with examples of discrimination by default against elderly road users. The frequent lack of convenient crossing facilities on city streets, the poor legibility of road signs, difficult entries/exits on public buses and the very high speed level on motorways in most countries are just a few classical examples which show that roads are equipped and controlled to match the needs and abilities of the young and able, but with little or no regard for the large road user minority of citizens whose maximum functional abilities have suffered the natural decline of age." (OECD, 1985)

When discussing environmental issues there are two sides to be considered, both of which have an impact on elderly drivers and pedestrians. One is the natural environmental condition which, while we cannot control, we can adapt to or compensate for. The other is the built environment, designed to meet specific needs. As the quotation above indicates, road systems are not generally designed to meet the needs of the elderly.

The two main issues in the natural environment are poor weather and lighting. Many people compensate for difficulties in coping with these by restricting their trips to daylight hours in clear weather. A second approach has been for community groups to lobby for more effective lighting and better clearing of ice and snow in neighbourhoods with a large proportion of senior citizens. Improvements have been noted in some areas.

The built environment is less easily dealt with. Planning is based on a norm, or the "average" user. Changes designed to benefit one group may have secondary effects that impact negatively on a second category of user. This section of the paper identifies specific features within the environment that are known to pose a problem for elderly drivers and pedestrians. Solutions need to be found that will improve mobility for seniors without creating a new hazard for others.

A. THE DRIVING ENVIRONMENT

o TRAFFIC CONTROL DEVICES

A number of difficulties arise through the design and placement of road signs. The print is often too small for people to read clearly until they get quite close, leaving little time for a person to respond appropriately. This is true for people of all ages, but the reduced vision and increased reaction time of many seniors compound the problems.

Many signs are complex and not easily understood. There are also many situations in which a number of different signs follow closely one after another. These situations can pose a problem as it generally takes elderly people longer than

their younger counterparts to process information. There is also the difficulty of having to interpret signs that may change with each jurisdiction a person drives in. Confusion may cause drivers to slow down or make sudden movements that can interrupt the flow of traffic and lead to accidents.

The colours used for signs and signal lights are also problematic. As the eye ages, the ability to perceive contrasts declines and some colours, including red, become more difficult to recognize. The traffic signal system is, in many cases, based on the assumption that people will see a particular colour and be able to act appropriately, even if they do not recognize the symbol on the sign (i.e. red means "stop", yellow means "caution").

o **ROAD DESIGN**

Most traffic accidents happen at intersections. Drivers are often faced with multiple choices of where to go, vision is frequently blocked by buildings or some other obstruction, pavement marking systems are often confusing, faded or difficult to see and little opportunity is available to correct an error once it is realized. These problems are compounded by the high speeds used by most drivers in today's traffic. A report by the Organization for Economic Cooperation and Development (1985) concluded that "any

measure designed to reduce speeds at the approach to an intersection or to any particular hazard will enhance the road safety of the elderly by reducing the causes of faulty judgement, extending the time available for assimilating data and reducing the "pressure" exerted by other drivers."

o NIGHTTIME DRIVING

Two main issues arise for elderly drivers at night: headlight glare and the poor illumination of people, signs and road markings. These again are problems due to the aging of the eye. Tests show that it takes longer for older eyes to adjust to oncoming lights and variable lighting conditions during nighttime driving. Legibility standards used to determine the levels of brightness and reflectivity necessary on signs are based on a norm for younger people and do not take into consideration the special needs of older drivers.

o CAR DESIGN

There are a number of adaptions that can be applied to make cars both easier and safer for elderly drivers, ranging from the installation of air bags for the protection of frail bodies to the addition of high mounted brake lights to make them more visible for people with a limited field of vision.

B. THE PEDESTRIAN ENVIRONMENT

While walking is one of the most recommended forms of exercise for seniors, it can be one of the most dangerous. Uneven sidewalks, objects placed on the sidewalk, high curbs and poor lighting can all lead to accidents, even if a person is only going for a walk around the block.

Street crossing is particularly hazardous for seniors. The time allotted for crossing at intersections with walk signals is based on a norm for younger people and often is not long enough for elderly people. Busy intersections can cause confusion and result in delayed reactions, which again can lead to accidents. Elderly people are more likely to have restricted vision and also tend to have more difficulty than younger people judging the speed of oncoming traffic. These items should all be taken into consideration in environmental planning, particularly in neighbourhoods with a high concentration of elderly residents.

IV. OPTIONS FOR THE FUTURE

"Safer cars and highways will help bring down the accident rate among older drivers, as they have for all classes of drivers almost since driving began. However, they will not lessen appreciably the over representation of older drivers in accidents, the number of accidents that are clearly attributable to age, or the public's concern over both. To

lessen these will take changes in the older drivers themselves." (McKnight, 1987)

Changing the accident statistics of elderly drivers and pedestrians will require a cooperative effort from all people involved. There are many ways to approach the problems.

This final section of the paper provides an overview of methods currently being used to assist elderly drivers and pedestrians and suggestions for further change. This does not represent a complete list of alternatives, but offers some options for consideration.

A. THE ELDERLY INDIVIDUAL

One of the most important changes a person can make is to be aware of what is happening in his or her body and the impact those changes can have on mobility. Regular medical and eye examinations and discussing the findings with the doctor can help to identify problems before they get serious. Taking corrective measures from the start may keep a person mobile later into life.

Another measure is to plan all driving trips in advance. Prepare by setting out a course to follow that does not involve complicated intersections, takes three right turns

instead of a left and avoids heavy traffic areas. Plan to drive during daylight and take along another person to act as a navigator whenever possible.

A variety of options are available on automobiles to make them safer for elderly people to drive. Air bags, in addition to seat belts, can be helpful as they provide a cushion that can prevent brittle bones from breaking. Larger or convex mirrors are useful for people who have trouble turning to check over their shoulder. A clear glass windshield is less likely to add to vision problems. Shopping carefully for a car and taking all factors into consideration when choosing options can make driving safer.

An important measure that can be taken by elderly drivers and pedestrians alike is to become educated on the issues, signs to watch for and appropriate countermeasures to take. A variety of programs are available, such as the "55 Alive/Mature Driving" program offered through the Canada Safety Council. These programs teach about age-related changes that have an impact on driving and suggest defensive driving techniques aimed specifically at the older population. Some senior centres also offer seminars on safety for their members.

B. HIGHWAY PLANNING AND CONTROL

As was mentioned previously, road planning is based on a norm that does not take into consideration the special needs of elderly drivers. With the aging of society, the norm needs to change.

Signs can be developed that are easier to read, to understand and to see in the dark. Colours should be chosen that can be identified easily by older drivers. The use of uniform traffic control devices, without provincial changes, would be helpful for all drivers.

The placement of signs should reflect the time necessary for people of all ages to react appropriately. Signs should not be placed so close together that a person does not have time to react to one before coming to another.

Intersection design could be simplified for the benefit of all drivers. Fewer choices, a clear indication of which lanes go where, an unobstructed view and speed limits that reflect the level of concentration necessary to complete the manoeuvres would aid in this process.

Lighting systems should provide enough illumination to allow drivers and pedestrians to see at night but at the same

time should not give a blinding glare. On highways, glare screens can help to reduce the chance of accidents.

C. CROSSWALK SYSTEMS

Many studies have been conducted over the past ten years on how to improve pedestrian crosswalk systems. A number of changes have been recommended specifically for the elderly and handicapped population: longer walk signals at controlled intersections; signs to indicate to drivers that there may be slow people crossing the street; curb ramps to make entering and exiting the street easier; barriers to prevent people from crossing where it is not safe; safety islands on wide or busy streets; over or underpasses to allow people to bypass traffic altogether; more one-way streets so people do not have to watch in both directions at once; restricted parking near crosswalks; mid-block crosswalks where there is a great distance between intersections; and relocating the stop line to a point further from the crosswalk have all been recommended. Some of these methods are being used in various locations now and studies are being conducted to determine the effectiveness of different alternatives. (See, for example, Atkinson, 1987)

CONCLUSION

People do go through many changes as they age. However, "Old Age" in Canada no longer means isolation from daily social and economic activities. New features are being introduced in the environment to make it easier for seniors to carry on an active lifestyle.

Mobility is a vital area of concern, one that we all must work on to improve, and the most important change people can make is to become aware. This is true for seniors, people working with seniors, people planning the environment and designing vehicles and all others who are interested in a comfortable life in their later years. Identifying the problem is the first step to finding the solution.

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